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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/783,788 | 02/20/2004 | Takahiro Sasaki | 1232-5298 | 7180 |

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| EXAMINER | |
|---|---|
| PRITCHETT, JOSHUA L | |
| **ART UNIT** | **PAPER NUMBER** |
| 2872 | |

DATE MAILED: 07/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/783,788 | SASAKI ET AL. | |
| | Examiner | Art Unit | |
| | Joshua L. Pritchett | 2872 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☒ Claim(s) *32-34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/04,5/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Objections*

Claims 32-34 are objected to because of the following informalities: the order of mirrors mentioned in claim 32 is different than the order of mirrors required by the parent claim 23. The claim will be examined as if the order of mirrors were the same as that claimed in the parent claim 23. Claims 33 and 34 depend from claim 32 and inherit the deficiencies thereof. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6-15 and 17-22 rejected under 35 U.S.C. 102(e) as being anticipated by Hudyma (WO 02/056114).

Regarding claim 1, Hudyma discloses a catoptric projection system for projecting a pattern on an object surface (OB) onto an image surface (IM), the catoptric projection optical system comprising a plurality of mirrors (M1-M6), wherein a second mirror from the image surface (M5) through the optical path receives convergent pencil of rays (Fig. 1) and has a paraxial magnification of –0.14 or smaller (page 7 lines 2-3).

Regarding claims 2 and 13, Hudyma discloses the catoptric projection optical system includes six or more mirrors (Fig. 1).

Regarding claims 3 and 14, Hudyma discloses a third mirror from the image surface through the optical path has the largest effective diameter among the plural mirrors (Fig. 1).

Regarding claims 4 and 15, Hudyma discloses all of the plural mirrors are aspheric mirrors including a multilayer coating that reflect light having a wavelength of 20nm or smaller (page 18 lines 8-9).

Regarding claims 6 and 17, Hudyma discloses the catoptric projection optical system is non-telecentric at a side of object surface (Fig. 1).

Regarding claims 7 and 18, Hudyma discloses the plural mirrors form an intermediate image (IMI).

Regarding claims 8 and 19, Hudyma discloses the intermediate image does not accord with a surface of one of the plural mirrors (Fig. 1).

Regarding claims 9 and 20, Hudyma discloses all the plural mirrors are arranged between the object surface and the image surface (Fig. 1).

Regarding claims 10 and 21, Hudyma discloses the second mirror from the image surface through the optical path has a paraxial magnification between –30 and –0.4 (page 7 lines 2-3).

Regarding claims 11, 12 and 22, Hudyma discloses an angle between two marginal rays of the convergent pencil of rays is 9-degrees or greater in meridional plane, when the catoptric projection optical system has a numerical aperture of 0.25 (page 16 lines 1-20). Hudyma states that the angle between the rays is about 8.7-degrees for a numerical aperture of 0.22 and that the values of the Tables shown would increase between 14 and 50 percent if the numerical aperture were increased to 0.25 (pages 14 and 15). The increase to move the numerical aperture from 0.22 to 0.25 would cause the angle to increase to a value greater than 9-degrees.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

- Claims 5, 16, 35, 36, 38-41 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hudyma (WO 02/056114) in view of Terasawa (US 2003/0147131).

Regarding claims 5 and 16, Hudyma teaches the invention as claimed but lacks reference to the use of a reflection mask arranged on the object surface. Terasawa teaches the use of a reflection mask on the object surface (Fig. 5). Fig. 5 shows that the mask (MS) reflection light from element 210. It would have been obvious to a person of ordinary skill in the art at the time

the invention was made to have the Hudyma invention include the reflection mask as taught by Terasawa for the purpose of recording a reflected image onto the image surface.

Regarding claims 35, 36, 38-41 and 44, Hudyma teaches the invention as claimed but lacks reference to the mask and wafer scanning system. Terasawa teaches the use of a mask stage to support a mask, a wafer stage to support a photosensitive layer and a mechanism for synchronously scanning the mask and wafer stages while the mask is illuminated by light having a wavelength of 20nm or smaller (para. 0020). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Hudyma invention include the scanning system of Terasawa for the purpose of creating an image larger than a single beam of light.

Claims 23-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hudyma (WO 02/056114) in view of Hudyma (US 6,262,836).

Regarding claim 23, Hudyma '114 teaches the invention as claimed including six mirrors (M1-M6) reflecting light sequentially (Fig. 1) and the fifth mirror receiving a convergent pencil of rays (Fig. 1), but lacks reference to the first mirror being convex. Hudyma '836 teaches the use of a first mirror being convex (Fig. 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the Hudyma'114 invention include the convex first mirror of Hudyma '836 for the purpose of creating a larger image on the image surface.

Regarding claim 24, Hudyma '114 teaches the fifth mirror (M5) receives convergent pencil of rays (Fig. 1) and has a paraxial magnification of –0.14 or smaller (page 7 lines 2-3).

Regarding claims 25 and 31, Hudyma '114 teaches an angle between two marginal rays of the convergent pencil of rays is 9-degrees or greater in meridional plane, when the catoptric projection optical system has a numerical aperture of 0.25 (page 16 lines 1-20). Hudyma states that the angle between the rays is about 8.7-degrees for a numerical aperture of 0.22 and that the values of the Tables shown would increase between 14 and 50 percent if the numerical aperture were increased to 0.25 (pages 14 and 15). The increase to move the numerical aperture from 0.22 to 0.25 would cause the angle to increase to a value greater than 9-degrees.

Regarding claim 26, Hudyma '114 teaches the plural mirrors form an intermediate image (IMI).

Regarding claim 27, Hudyma '114 teaches the intermediate image does not accord with a surface of one of the plural mirrors (Fig. 1).

Regarding claim 28, Hudyma '114 teaches all the plural mirrors are arranged between the object surface and the image surface (Fig. 1).

Regarding claims 29 and 30, Hudyma '114 teaches the second mirror from the image surface through the optical path has a paraxial magnification between –30 and –0.4 (page 7 lines 2-3).

Regarding claim 32, Hudyma '114 teaches the intermediate image is formed between the fourth and the third mirrors (Fig. 1). Fig. 1 shows that the intermediate image is physically formed between the fourth and third mirrors.

Regarding claim 33, Hudyma '114 teaches the intermediate image is formed between the fourth and sixth mirrors (Fig. 1). Fig. 1 shows the intermediate image is formed physically between the fourth and sixth mirrors.

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hudyma (WO 02/056114) in view of Hudyma (US 6,262,836) as applied to claim 32 above, and further in view of Terasawa (US 2003/0147131).

Hudyma '114 in combination with Hudyma '836 teaches the invention as claimed but lacks reference to the intermediate image between the sixth and third mirrors. Terasawa teaches the intermediate image (IM) formed between the sixth (160) and third (130) mirrors (Fig. 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the Hudyma '114 include the intermediate image in the location taught by Terasawa for the purpose of maintaining a coherent image through the projection system.

Claims 37, 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hudyma (WO 02/056114) in view of Hudyma (US 6,262,836) and Terasawa (US 200/0147131).

Hudyma '114 teaches the invention as claimed including six mirrors (M1-M6) reflecting light sequentially (Fig. 1) and the fifth mirror receiving a convergent pencil of rays (Fig. 1), but lacks reference to the first mirror being convex and the scanning system. Hudyma '836 teaches the use of a first mirror being convex (Fig. 5). Terasawa teaches the use of a mask stage to support a mask, a wafer stage to support a photosensitive layer and a mechanism for synchronously scanning the mask and wafer stages while the mask is illuminated by light having a wavelength of 20nm or smaller (para. 0020). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Hudyma '114 invention include the scanning system of Terasawa for the purpose of creating an image larger than a

single beam of light. It would further have been obvious to one of ordinary skill in the art at the time the invention was made to have the Hudyma'114 invention include the convex first mirror of Hudyma '836 for the purpose of creating a larger image on the image surface.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua L. Pritchett whose telephone number is 571-272-2318. The examiner can normally be reached on Monday - Friday 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A. Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JLP

DREW A. DUNN
SUPERVISORY PATENT EXAMINER